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(54) ROTOR BLADE INSPECTION SYSTEM

(57) An inspection system (88) for rotating fan rotor blades (58) in a gas turbine engine (20) is provided. The system includes a plurality of cameras (100) and lids (108), and a cleaning system (94). The cameras (100) are each controllable to capture an image of a leading edge (62) of a fan rotor blade (58) and produce signals representative thereof. Each camera (100) is mounted to a static structure (54, 74) disposed forward of the fan rotor blade stage (52). The lids (108) are attached to the static structure and are selectively movable between closed and open positions. In the closed position at least one camera (100) is enclosed. In the open position the camera (100) is at least partially exposed and has a field of view of the rotating fan rotor blades (58). The cleaning system (94) is controllable to selectively produce a body of fluid relative to the at least one camera (100) when the respective lid (108) is in the open position.

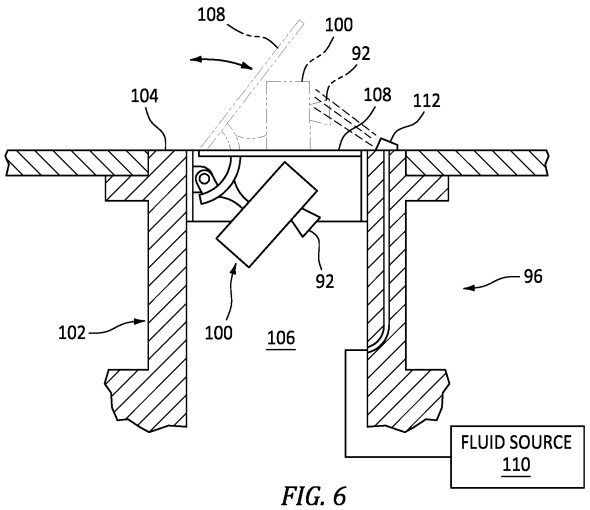

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 24 17 1103

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 2 925 972 B1 (UNITED TECHNOLOGIES CORP [US]) 2 January 2019 (2019-01-02) * paragraphs [0021] - [0025], [0028]; figures 2, 4a, 4b *	1-8,11	INV. F01D21/00 F01D25/00
Y	US 2022/403787 A1 (SCHLEIF KURT K [US]) 22 December 2022 (2022-12-22) * paragraphs [0021] - [0023]; figures 1,2 *	1-8,11	
A	US 2019/338666 A1 (FINN ALAN MATTHEW [US] ET AL) 7 November 2019 (2019-11-07) * paragraphs [0008] - [0010], [0021], [0035], [0058]; figure 5 *	1-12	
A	US 2020/056501 A1 (EASTMENT BENJAMIN J [GB]) 20 February 2020 (2020-02-20) * paragraphs [0005] - [0007], [0016], [0020], [0030] - [0034], [0038], [0054], [0071], [0078]; figure 3 *	1-12	TECHNICAL FIELDS SEARCHED (IPC)
A	JP 2010 145652 A (SONY CORP) 1 July 2010 (2010-07-01) * paragraphs [0002], [0003], [0012], [0013]; figures 1-4 *	1-12	F01D F02C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 July 2024	Teusch, Reinhold

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-12

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

Inspection system comprising cameras to capture an image of the leading edge of a fan rotor blade, each camera being mounted to a static structure disposed forward of the fan rotor blade stage, lids are attached to the static structure and movable between a closed position and an open position, wherein in the closed lid position the camera is enclosed, and in the open position the camera is exposed and has a field of view of the fan rotor blades, and a cleaning system producing a body of fluid relative to the camera when the lid is in the open position.

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2. claims: 13-15

Method of inspecting rotating fan rotor blades comprising:
determining a rotational speed of the fan rotor stage;
during a shutdown period, controlling cameras to capture images of fan rotor blade leading edges once the fan rotor stage has reached a predetermined fan rotor stage rotational value;
controlling light sources to illuminate the fan rotor blade leading edges during the imaging; and
controlling a cleaning system to produce a body of fluid relative to each camera during imaging.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 17 1103

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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16-07-2024

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